Khándesh, Násik, Ahmednagar, Poona, Sátára and Sholápur divisions which have been treated since 1879 for reboisement, are now showing a promising growth of saplings: the Bársi hills in the Sholápur division being a conspicuous example. But the undulating uplands or máls in the Deccan are the toughest to deal with, and though fodder bushes and scrub fuel bushes will appear upon them, it will occupy the better part of 50 years to cover them with timber.

8.—ARTIFICIAL REPRODUCTION.

171. In the Thána Collectorate operations are confined to—

(a) old plantations and kurans.

(b) the exploited coupes (closed forests).

(c) acquired occupied lands within the boundaries of forest reserves such for instance upon the catchment of the Tánsa lake.

Forest guards planted up patches within their own beats as part of their regular work. Seeds were collected by guards and by hired labour.

172. In the North Thána division 7,204 acres were under cultural treatment, transplants from surrounding forests being moved into the exploited coupes of the season. Sandalwood was planted in every range on a small scale in specially selected and prepared sites. The total cost of the works amounted to Rs. 855. In the South Thána division 225 acres, outside the coupes recently closed were planted up, and 122 acres of plantation were made by forest guards in their respective beats: some of these were doing very well in the hot weather, especially in the Koshimshet, Sakurlé, Chargaon, Sháhápur and Umgaon forests.

173. In the East Khándesh division 56 khandis 2 maunds and 9 seers of seeds were sown over 3,020 acres of Reserved Forest, of which 573 acres were treated by dibbling, 599 acres of bábul reserves by full ploughing, 1,823 acres were pitted over and sown, and 25 acres were broad-casted. Mr. Desái reports the results in the South Tápti ranges to be unsuccessful, but in the North Tápti forests to be promising.

174. In the West Khándesh division 72,200 acres were broad-casted over with seeds and upon 297 acres dibbling has had recourse to, while 5 acres in a bábul reserve were ploughed and sown. As the rains were heavier than usual, the seedlings made a fair start, but later on a large number of them withered away. Seedlings which had been grown in pots in the Dhulia and Dahivel nurseries were planted out in the forest areas with fair success.

175. The rains were scanty and late in coming to the Násik district, and the plantations did not do so well in consequence as could be desired; many seedlings died during the hot weather. Each forest guard planted up his five acres in the forests of his beat, sandalwood plantations were started on a small scale in each range, seed having been obtained from Coorg, but a large proportion did not germinate, and many plants did not survive the hot weather.

176. In 1890 a plantation was started at Páthardi at the foot of the Lena hill in the Násik range, about 6 miles from the city of Násik: its site is of an old tank, the dam of which must have been swept away many years ago, and it is full of deep alluvial soil. This plantation has been watered from the old Budhist caves carved in the low scarp that runs across the north face of Pándao-Lena hill, about half way up or over 600 feet above the plantation. All the caves contain cisterns cut out in the rock to hold water; these cisterns have small mouths and spread inside into a large quadrangular hollow, and are full of water. At the outset a tin half-round pipe about 700 feet in length was fixed from the caves to the plantation, and a man used to go up to the caves and pour water into the tube on the top, and another man caught it at the bottom in buckets: but last year it was suggested that the use of a syphon to bring the water down would be of advantage, and Mr. Betham has now fitted one which works admirably; 50 feet of iron piping 1 inch in diamater fitted at each end with a brass cock was obtained from Bombay at a cost of Rs. 13, and a large iron tank purchased for Rs. 64 has been placed in the plantation, and 400 feet of additional tin piping costing 9 annas per running foot had to be fixed to the old gutter, and now a forest guard goes up to the cave and turns a cock which allows the water to run down the pipe and fill the iron tank 4′ × 4′ in the plantation, which is

flourishing with a very fine growth of bábul, bamboo, ain, moho, tamarind, teak, siras and many other seedlings.

177. The Ahmednagar division also had cause to complain of the rainfall which was inimical to its plantations; 92 acres and 14 gunthas representing the exploited coupes in the bábul reserves upon the banks of the large rivers of the district were thoroughly ploughed up and sown with Sind bábul seeds, with very satisfactory results; 2,861 acres of hill slopes in the western ranges of Akola and Sangamner, including all the exploited coupes of the season, were dibbled over with teak and other seeds, at distances of 10 feet apart; the results, however, are not yet fully seen; over 245 acres seeds of tarwad (Cassia auriculata) were dibbled at distances of 10 feet apart in the Reserved Forests, which are open to sheep grazing, as sheep will not touch this plant, the bark of which provides excellent material for tanning purposes. Seeds of the nimb (Azadirachta indica) were sown inside of and under the protection of thorny bushes in shallow pits over 2,818 acres of forest in all the ranges; this tree is very hardy and grows well out of the centre of euphorbia and other armed bushes, enjoying in youth the protection thus afforded; 2,168 acres of bábul reserves were sown plentifully broad-cast with bábul seeds, but the want of rain delayed their germination; 5,500 pits were dug by hired labour on wages in the midst of forests along the ghâts in the Akola range, and were sown with seeds of the hirda (Terminalia chebula): while 145,275 pits, distributed over all the forest beats in the division, were dug and sown up with seeds by forest guards, who collected 133 khandis of seeds, and who broad-casted 12,695 acres of forests in all the ranges with the quantity of seeds remaining after the pits prepared by them had been sown up. The regular watered plantation at Dongargan is doing very well; it had been fully stocked in previous years, but the Hanmantgaon plantation was not in such good condition. Small plantations of sandalwood were attempted in each range, but with indifferent results.

178. The forest guards of the Poona division collected 177 khandis 12 maunds and 11 pounds of seeds, and they prepared with their own hands 129,500 pits in which seeds were sown, and they likewise broad-casted seeds over 993 acres, all without expense to Government. All the exploited coupes in the bábul reserves representing 404 acres 21 gunthas were ploughed and sown, and 46,151 pits were made in the hill reserves by hired labour, and were sown with mixed seeds. In the nursery attached to the range forest office in the city of Poona 1,000 date plants and 2,000 sandal plants are doing well, and there are likewise upwards of 50,000 teak and other seedlings in small pot, being got ready for planting out upon the hill sides overhanging the Southern Marátha Railway in the Haveli range. The sandalwood experimental plantations, with seeds obtained from Coorg, did not succeed. But Sind bábul seeds, sown in all the river bank bábul reserves, are making a promising show. The rainfall was inimical, but where cattle and man are kept out there nature restores ligneous vegetation to the soil and forces it to grow despite climatal conditions being unfavourable.

179. Mr. Fagan, Deputy Conservator of Forests, came to the Sátára district as Divisional Forest Officer during the year of this report after an absence from the district of 15 years, and in his administration report he records that he has seen some very good plantations, the result of continued labour and careful protection during the past 15 years; and they show more than anything else how trees of valuable species can be brought on to land that previously contained nothing, whatever it might have had originally in the shape of forests. The plantations at Borgaon, Dare Budruk, Kodoli in the Sátára range, at Chachegaon in Karád, at Mandrul in Pátan, Aitodeh in Válva, at Lingmála, Pádli in Koregaon, besides many others testify to the unceasing and successful endeavours of the department to grow trees under extremely unfavourable conditions. The year of the report was an exceptionally bad one for plantations in the Sátára district; the rainfall was irregular and below the average. The sandalwood nurseries suffered from the drought, and plantations which are supplied with water from the Public Works Department canals had their supply cut off. Nearly one hundred rupees were expended in clearing out springs and deepening them when the water ran short in the Vellu, Borgaon and Aitodeh plantations. 20,844 acres of hill-sides within Reserved Forest were sown broad-

cast with seeds, the greater portion of it by forest guards, who collected personally much of the seeds; and 1,182 acres and 35 gunthas of hill-sides were likewise treated by forest guards in a more detailed manner, for they dug pits and sowed seeds in them.

180. In the Sholápur division the smaller kinds of seeds are broad-casted, whilst the larger kinds, such as ain, teak, &c., have been dibbled into the soil by paid labour. Each forest guard in charge of a beat is required to prepare 100 pits for mangoes 2′ × 2′ × 2′, and 3,600 pits 1 foot in diameter and 1 foot deep for other seeds such as bábul, nimb, bor (Zizyphus jujuba), tamarind, &c., the sowings being effected just before the setting in of the monsoon rains. By expenditure costing Rs. 437-15-8, of which hired labour came to Rs. 169-11-2, a total of 3,787 acres were operated over, 3,553 acres and 18 gunthas of it having been treated by broad-casting, and 235 acres and 26 gunthas by dibbling. The cultural operations of beat guards, which were performed without any cost to the State, are to be seen in the table below:—

No.	Range.	Area pitted.	Area dibbled.	Area broad-casted.	Total.
		A. g.	A. g.	A. g.	A. g.
1	Sholápur	58 14	39 30	1,141 7	1,239 11
2	Bársi	6 29	.....	176 0	182 29
3	Mádha	48 0	.....	764 18	812 18
4	Karmála	62 0	20 4	589 0	671 4
5	Pandharpur	20 0	15 0	969 36	1,004 36
6	Sángola	30 0	30 0	1,722 0	1,782 0
7	Málsiras	31 0	35 0	2,413 0	2,479 0
	Total ...	256 3	139 34	7,775 21	8,171 18

The quantity of seeds collected by the forest guards in the division measured 78 khandis 17 maunds and 9½ seers, while 27 khandis 13 maunds and 12 seers were purchased, and 2 khandis 26 maunds and 13 seers were imported: so that in addition to the natural shedding of seeds by the trees standing in the forests operated upon, 109 khandis 2 maunds and 6 seers of mixed seeds were sown by human agency. Careful supervision is required to be maintained over the forest guards, both in the collection of seeds and in the sowing of seeds. It may be taken that, practically, the seeds mature on the trees in April and May, and they have to be under the soil before the 1st June, when seeds are bought they are measured before the pátil and the kulkarni of the village, who testify to correct weight and to proper price paid and charged. The results of the majority of the sowings have been all that could be wished in the Kamthi Budruk Reserved Forest; the bábul seedlings from the beat guards broad-casting came up quite as thickly as a grain crop, and that in a year when the rainfall has been admittedly untimely and scanty. Bábul and other forests, which have been created since the days of the Deccan famine, are being worked now by the axe for the local market, and away in the far east in the Bársi range there is a very promising young mixed forest coming on upon the slopes of the low hills on the northern frontier, more particularly at Yedshi where the growth is especially close and vigorous; the teak tree has re-appeared and is growing beautifully in goodly numbers, after it had been so long absent that the oldest villager knew it not by sight and could not fix a name to it.

181. Though the season was excessively wet in Gujarát, the rains held off completely during June in the Surat division, whereby planting operations were much delayed. Exploited coupe No. 1 of the Gandeva Reserved Forest was sown up in pits 1 foot deep and 6 feet apart, with seeds from the Dángs; seedlings locally raised were also planted out in it, teak occupying every alternate pit; and in the month of November 1891, the whole surface was carpeted with seedlings and shoots; blanks were planted up in reserves in all the ranges by transplants of naturally sown seedlings from surrounding forests by hired labour, and every forest guard had to plant one acre in his beat

without outside help, and in addition thereto to broad-cast seeds over a larger area. The results are satisfactory. The Goema Reserved Forest now exhibits a very interesting spectacle to a forester: its site was barren waste land in the knowledge of the writer of this report 23 years ago, and it was then sown up chiefly with bábul; and seedlings of teak, of terminalia, anogeissus, dalbergia, &c., raised in nurseries, were planted out, subsequently among the bábul; the latter grew up to marketable size, and has been cut out at different times after it had been overtopped by the teak and junglewood saplings, which are now entirely suppressing the few remaining bábul trees in the struggle for the survival of the fittest, while the receipts already obtained by the sale of the exploited bábul wood has more than paid the expenses of creating a very rich little forest estate.

182. One hundred and fifty-eight maunds and 13 seers of seeds of teak and other trees were dibbled by forest guards during the rains of 1891 over 373 acres of blanks within the Reserved Forests of the Panch Maháls division. 89 acres were added to the Vejalpur plantation where 26 maunds and 6 seers of seeds were sown, and blanks inside the reserves in all the ranges were sown and planted up by hired labour. The seeds germinated very well and in the early part of the cold weather the seedlings, especially the bábul in the Eastern Kálol block raised from seeds imported from Sind, were looking healthy, but failure of the late rains tried the growing plants. The Conservator found the forests generally well filled with young growth, except in the very exposed portions, where cattle puddle the ground in the rains, and its surface hardens under the subsequent action of the sun into the similitude of sun-dried bricks.

183. This statement shows the total expenditure incurred on plantations in the several divisions of the Northern Circle with the areas treated during the year under different methods:—

No.	Division.	Regular Plantations.				Cultural Operations.				Total Cost.	Remarks.
		Area in Acres.				Area in Acres.					
		On 1st April 1891.	Added.	Excluded.	On 31st March 1892.	On 1st April 1891.	Added.	Excluded.	On 31st March 1892.		
		Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Rs.	
1	North Thána ...	2,215	10	...	2,225	15,860	7,204	...	23,064	792	
2	South Thána ...	390	225	171	444	4,284	122	...	4,406	789	
3	East Khándesh ...	...	...	...	...	15,849	3,020	...	18,869	75	
4	West Khándesh ...	42	...	25	17	20,930	265	...	21,195	605	
5	Násik	...	...	...	...	8,188	865	394	8,659	1,236	
6	Ahmednagar... ...	142	...	...	142	11,098	8,756	...	19,854	2,024	
7	Poona...	...	408	...	408	39,937	1,187	...	41,124	1,644	
8	Sátára	3,194	17	...	3,211	114,786	1,364	...	116,150	666	
9	Sholápur	...	...	...	...	59,430	3,789	...	63,219	436	
10	Surat	...	...	...	...	1,006	265	...	1,271	853	
11	Panch Maháls ...	113	123	...	236	449	160	...	609	259	
	Total ...	6,096	783	196	6,683	291,817	26,997	394	318,420	9,379	

9.—EXPERIMENTS WITH EXOTIC TREES.

184. Nothing new has been attempted in this direction during the year. The casuarina can scarcely be termed an exotic in the present day, as it is well established and has naturalised in the flora of Western India. The casuarina plantations along the sea shore in the Dáhánu and Umbargaon ranges of the North Thána division are doing fairly well. A quantity of seeds obtained from Kárwár in the Kánara district were sown in a nursery at Tithal near Bulsár, in view of making plantations upon the available waste lands on the sea shore in the neighbourhood. The nursery was well screened against the south-westerly winds, which blow with violence during the monsoon, and the seeds germinated very profusely; when they were a month old they were transferred to pots made by tying together face to face two ordinary roof tiles; and at the end of the year 1,255 plants, about one foot high, were in the nursery. If the plantation at Tithal is a success, as there is every reason to believe it will be,